with the help of a two-man submarine.

One of the major considerations for the caps revolved around ARCO's future exploration and production activity plans in the Santa Barbara Channel. The company hopes to offset the incidental air emissions that accompany drilling by "banking" the seep savings, removing 1.2 parts pollution for every one part that is released, as required by the California State Air Resources Board.

Building Better Seaweed

Genetic engineers may soon be at work cloning marine plants.

The development stems from the work of cell biologist Aharon Gibor, a University of California Santa Barbara professor who has researched methods to speed and improve the reproductive cycle of certain edible seaweeds in Japan. Growers there have long reaped a crop of a seaweed delicacy called nori, an extremely valuable product.

Cultivated in tubs in warehouses before being transferred to the Inland Sea, where it grows to maturity on rope nets, nori is dried and pressed into paperlike sheets and sold in cellophane packages throughout Japan and Asia. It is eaten with rice rolled inside—a sushi staple—or crumbled on soup.

The process to raise it, however, is time-consuming and expensive because it requires the laborious cultivation of two generations to produce the plant that is ultimately harvested. Unlike terrestrial plants, nori does not reproduce by means of seeds, but by spores—and in two stages. The first generation comes from the mature nori and is called conchocelis. Tiny and inedible, it is collected in the open sea on long strings of oyster or clam shells. Afterward it sits in tubs of seawater for six months to a year, until it grows roughly to the size of tree moss. The trickiest part of the culturing, Gibor explains, comes in December when the conchocelis plants release their spores during a certain phase of the moon. If the seaweed farmers are not ready with their nets set to capture and transplant the spores, then the plant cannot survive.

"The planting of the rope nets is a dramatic operation that takes place at dawn on the appropriate day," the biologist says. "The nets are rolled on huge mechanized drums partly submerged in a pond of seawater that contains the released spores."

By use of a sophisticated research microscope, the operators maintain continuous control of the number of spores that attach to the nets. Then the seeded nets are taken to the Inland Sea, where they are unrolled, secured with ropes, anchors and buoys, and left until the plants mature and are ready for harvesting.

Cloning could totally eliminate the lengthy spore stages by simply taking cell samples from a mature plant in the ocean and regrowing a duplicate. More importan to Dr. Gibor, it makes genetic improvemen of the crop possible. An individual plant tha distinguishes itself by its flavor, hardiness, o some other desirable characteristic could b specifically collected and propagated.

"Just as more nutritious and disease resistant strains of wheat and corn have bee produced on land," Gibor says, "bette strains of marine plants also may be deve oped."

So far the Japanese have not tried to app Gibor's research on a commercial scal However, the biologist hopes to spark mo interest in the idea next summer, when plans to take part in an international se weed symposium to be held in the Peopl Republic of China, another nation with co siderable mariculture enterprises.

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